2.6 INITIAL AND BOUNDARY CONDITIONS

Initial and boundary conditions are prescribed in the form of discharges or stages. For Lake Okeechobee, historical stage is used at the start of simulation. For grid cells or nodes, the elevation of the water table and ponding depth, if applicable, are initialized as being equal to their historical values. In some areas where monitoring stations are not available, a horizontal pool is assumed as initial condition. For instance, historical gage reading for station 2A-17 applies to all cells within Water Conservation Area 2A. For canals, the initial water level is assumed to be equal to the maintenance level or the historical headwater level at the downstream structure. The choice between the two options does not really make any difference as far as inferences drawn from the model output since the model is intended to be run on a long-term (several years) basis.

Boundary conditions refer to the time series of flows or stages at the peripheral grid cells of the model. The general southeasterly direction of both natural (overland and groundwater flow) and man-controlled (structure discharge) flows in South Florida allows the northern boundary condition to be defined in terms of historical or independently simulated flows depending on the scenario simulated. In the 1990 base scenario for the Lower East Coast Regional Water Supply Plan (LECRWSP; see SFWMD, 1995), historical inflows through S-65E from the Kissimmee Basin prior to completion of the Kissimmee River Restoration Plan (Loftin, et al., 1990) define the boundary condition north of Lake Okeechobee. In the 2010 base scenario of LECRWSP, the Kissimmee River Restoration Plan is assumed to be in place and the corresponding inflows to Lake Okeechobee from Kissimmee Basin define a different northern boundary condition. The latter scenario was simulated by Krishnan (1994) using the CREAMS-WT model (Heatwole, et al., 1987).

A no-flow boundary condition for both surface water and ground water is imposed on the northwestern and midwestern boundaries except for discharges statistically correlated to available rainfall records (Krishnan, 1993a and 1993b; Trimble, 1995c) through structures G-88, G-89, G-155 and G-136. The westernmost grid cells in this area of the model are assumed to define a hydrologic drainage divide between the Water Conservation Areas (WCAs) and the Big Cypress National Preserve (BCNP). The southwestern portion of the model domain, where the model cuts the western portion of the Everglades National Park, is defined as a no-flow boundary as far as groundwater movement is concerned. On the surface, a uniform overland flow condition is imposed, i.e., the hydraulic gradient or water surface profile is always assumed to be parallel to land surface elevation.

On the northeastern boundary along the Martin-Palm Beach county line a no-flow boundary condition is assumed for both overland flow and groundwater flow.

Along the Atlantic coastal boundary to the south and east, the boundary condition is defined in terms of historical tidal data (Krishnan and Gove, 1993). Tidal data is preferred over a constant head (assumed to be 0.4 ft NGVD on the eastern seaboard of South Florida) because tidal levels in the southern tip of the Florida peninsula are generally higher than those found in higher altitudes. Based on available daily readings at six United States Geological Service (USGS) tidal stations (Fig. 2.6.1) along the Atlantic coast, six time series of mid-month long-term mean

historical tidal values are read into the model. The data (12 values per station) is assumed to repeat every year of simulation. Individual boundary cell values are interpolated in time for calendar days between the middle of two successive months and in space for boundary cells in between two adjacent stations. These values are passed to the groundwater subroutine as known head boundary conditions. No overland flow is assumed to occur passed the eastern boundary cells.

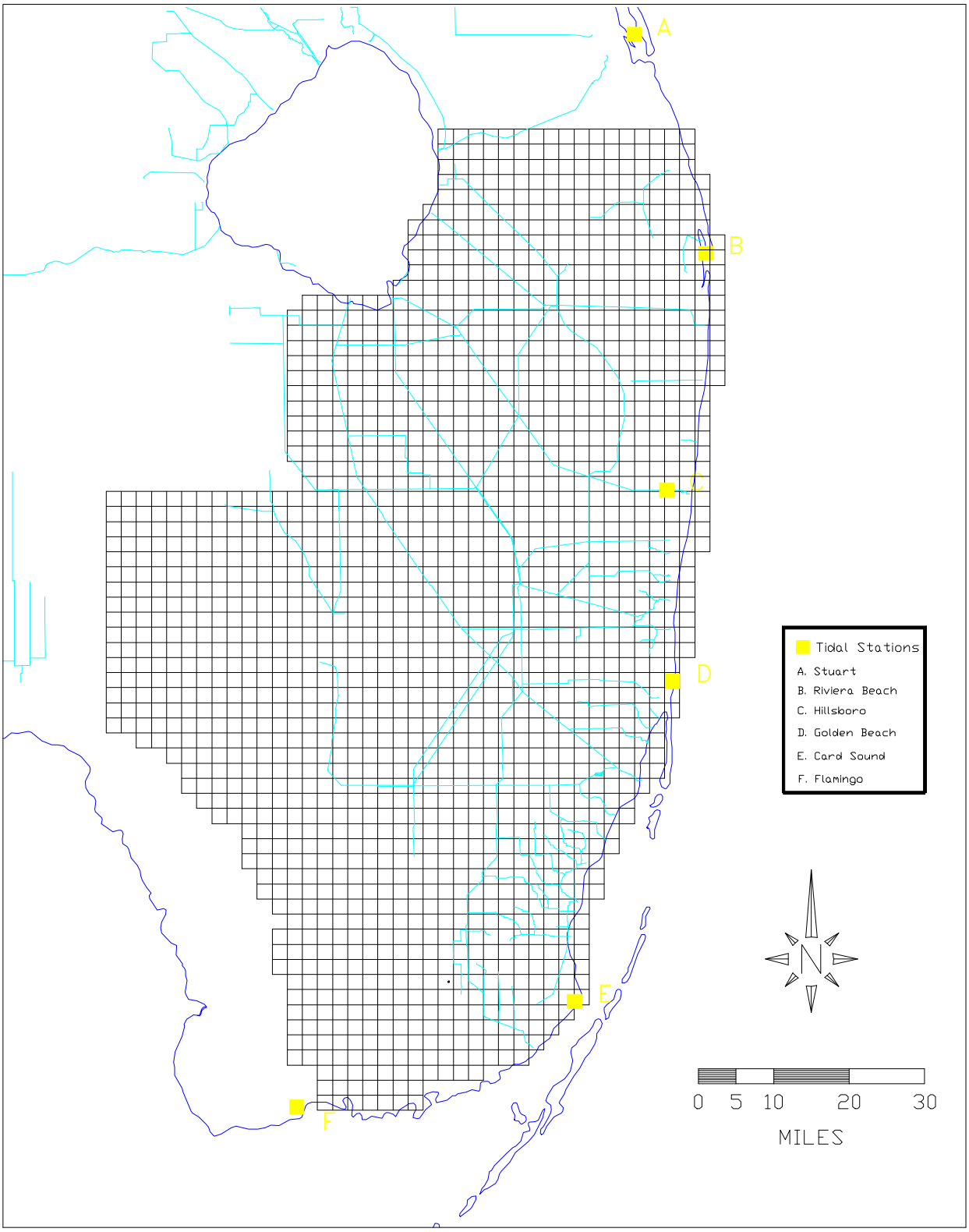

Figure 2.6.1 USGS Tidal Stations Used to Define Coastal Boundary Conditions in the South Florida Water Management Model